

We claim:

1. A method for supporting multiple Virtual Private Networks in an MPOA/NHRP communication system, the method comprising:
 - 5 establishing a connection in the communication system; and
using in-band signaling to designate the connection for a number of Virtual Private Networks.
- 10 2. The method of claim 1, wherein the act of using in-band signaling to designate the connection for a number of Virtual Private Networks comprises:
using in-band signaling to add a Virtual Private Network to the connection.
- 15 3. The method of claim 1, wherein the act of using in-band signaling to designate the connection for a number of Virtual Private Networks comprises:
using in-band signaling to remove a Virtual Private Network from the connection.
4. The method of claim 1, further comprising:
multiplexing packets from the multiple Virtual Private Networks over the connection.
- 20 5. The method of claim 4, wherein the act of multiplexing packets from the multiple Virtual Private Networks over the connection comprises:
encoding a Virtual Private Network identifier in each packet.
- 25 6. The method of claim 5, wherein the act of encoding a Virtual Private Network identifier in each packet comprises:
associating a unique tag with each of the multiple Virtual Private Networks;
determining the Virtual Private Network for a packet; and
including the corresponding tag in the packet.
- 30 7. The method of claim 5, wherein the act of encoding a Virtual Private Network

identifier in each packet comprises:

including the Virtual Private Network identifier in the packet.

8. The method of claim 7, wherein the act of including the Virtual Private Network
5 identifier in the packet comprises:

including the Virtual Private Network identifier in a header within the packet.

9. The method of claim 8, wherein the header comprises an LLC/SNAP header.

10. An apparatus for supporting multiple Virtual Private Networks in an MPOA/NHRP communication system, the apparatus comprising:

connection establishment logic operably coupled to establish a connection over the MPOA/NHRP communication system;

5 in-band signaling logic operably coupled to use in-band signals to designate the connection for a number of Virtual Private Networks; and

multiplexing logic operably coupled to multiplex packets from the number of Virtual Private Networks over the connection.

10 11. The apparatus of claim 10, wherein the in-band signaling logic is operably coupled to send an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be added to the connection.

12. The apparatus of claim 10, wherein the in-band signaling logic is operably coupled to
15 send an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be removed from the connection.

13. The apparatus of claim 10, wherein the multiplexing logic is operably coupled to
20 encode a Virtual Private Network identifier in each packet.

14. The apparatus of claim 13, further comprising a database mapping each Virtual Private Network to a unique tag corresponding to the Virtual Private Network.

15. The apparatus of claim 14, wherein the multiplexing logic is operably coupled to
25 receive a packet associated with a Virtual Private Network, retrieve the tag corresponding to the Virtual Private Network from the database, and insert the tag into the packet.

16. The apparatus of claim 13, wherein the multiplexing logic is operably coupled to
30 include the Virtual Private Network identifier in each packet.

17. The apparatus of claim 16, wherein the multiplexing logic is operably coupled to include the Virtual Private Network identifier in a header within each packet.

18. The apparatus of claim 17, wherein the header comprises an LLC/SNAP header.

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19. The apparatus of claim 10, wherein the in-band signaling logic is operably coupled to receive an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be added to the connection.

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20. The apparatus of claim 10, wherein the in-band signaling logic is operably coupled to receive an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be removed from the connection.

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21. The apparatus of claim 10, wherein the multiplexing logic is operably coupled to receive the packets over the connection and determine a Virtual Private Network for each packet.

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22. The apparatus of claim 21, wherein the multiplexing logic is operably coupled to determine the Virtual Private Network for each packet based upon inherent information within each packet.

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23. The apparatus of claim 21, wherein the multiplexing logic is operably coupled to determine the Virtual Private Network for each packet based upon a Virtual Private Network identifier encoded in each packet.

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24. The apparatus of claim 23, further comprising a database mapping each of a plurality of tags to a corresponding Virtual Private Network identifier.

25. The apparatus of claim 24, wherein each packet includes a tag, and wherein the multiplexing logic is operably coupled to retrieve the Virtual Private Network identifier from

the database based upon the tag.

26. The apparatus of claim 23, wherein each packet includes a Virtual Private Network identifier, and wherein the multiplexing logic is operably coupled to extract the Virtual
5 Private Network identifier from the packet.

27. The apparatus of claim 26, wherein the Virtual Private Network identifier is included in a header within each packet.

10 28. The apparatus of claim 27, wherein the header comprises an LLC/SNAP header.

29. A computer program product comprising a computer readable medium having embodied therein a computer program for supporting multiple Virtual Private Networks in an MPOA/NHRP communication system, the computer program comprising:

connection establishment logic programmed to establish a connection over the
5 MPOA/NHRP communication system;

in-band signaling logic programmed to use in-band signals to designate the connection for a number of Virtual Private Networks; and

multiplexing logic programmed to multiplex packets from the number of Virtual Private Networks over the connection.

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30. The computer program product of claim 29, wherein the in-band signaling logic is programmed to send an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be added to the connection.

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31. The computer program product of claim 29, wherein the in-band signaling logic is programmed to send an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be removed from the connection.

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32. The computer program product of claim 29, wherein the multiplexing logic is programmed to encode a Virtual Private Network identifier in each packet.

33. The computer program product of claim 32, wherein the multiplexing logic is operably coupled to a database mapping each Virtual Private Network to a unique tag corresponding to the Virtual Private Network.

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34. The computer program product of claim 33, wherein the multiplexing logic is programmed to receive a packet associated with a Virtual Private Network, retrieve the tag corresponding to the Virtual Private Network from the database, and insert the tag into the packet.

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35. The computer program product of claim 32, wherein the multiplexing logic is programmed to include the Virtual Private Network identifier in each packet.

5 36. The computer program product of claim 35, wherein the multiplexing logic is programmed to include the Virtual Private Network identifier in a header within each packet.

37. The computer program product of claim 36, wherein the header comprises an LLC/SNAP header.

10 38. The computer program product of claim 29, wherein the in-band signaling logic is programmed to receive an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be added to the connection.

15 39. The computer program product of claim 29, wherein the in-band signaling logic is programmed to receive an in-band signal including a Virtual Private Network identifier identifying a Virtual Private Network to be removed from the connection.

20 40. The computer program product of claim 29, wherein the multiplexing logic is programmed to receive the packets over the connection and determine a Virtual Private Network for each packet.

25 41. The computer program product of claim 40, wherein the multiplexing logic is programmed to determine the Virtual Private Network for each packet based upon inherent information within each packet.

42. The computer program product of claim 40, wherein the multiplexing logic is programmed to determine the Virtual Private Network for each packet based upon a Virtual Private Network identifier encoded in each packet.

30 43. The computer program product of claim 42, wherein the multiplexing logic is

operably coupled to a database mapping each of a plurality of tags to a corresponding Virtual Private Network identifier.

5 44. The computer program product of claim 43, wherein each packet includes a tag, and wherein the multiplexing logic is programmed to retrieve the Virtual Private Network identifier from the database based upon the tag.

10 45. The computer program product of claim 42, wherein each packet includes a Virtual Private Network identifier, and wherein the multiplexing logic is programmed to extract the Virtual Private Network identifier from the packet.

46. The computer program product of claim 45, wherein the Virtual Private Network identifier is included in a header within each packet.

15 47. The computer program product of claim 46, wherein the header comprises an LLC/SNAP header.

48. A communication system for supporting multiple Virtual Private Networks, the communication system comprising an ingress MPOA client in communication with an egress MPOA client over an MPOA/NHRP network, wherein the ingress MPOA client establishes a connection to the egress MPOA client over the MPOA/NHRP network, sends in-band
- 5 messages to the egress MPOA client over the connection in order to designate the connection for a number of Virtual Private Networks, and multiplexes packets from the number of Virtual Private Networks over the connection.

49. A method for supporting multiple Virtual Private Networks using the Next Hop Resolution Protocol (NHRP), the method comprising:

determining a Virtual Private Network for each NHRP message; and
encoding a Virtual Private Network identifier in each NHRP message.

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50. The method of claim 49, wherein the act of encoding the Virtual Private Network identifier in each NHRP message comprises including the Virtual Private Network identifier in a header within each packet.

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51. The method of claim 50, wherein the header is a LLC/SNAP header.

52. The method of claim 49, wherein the act of encoding the Virtual Private Network identifier in each NHRP message comprises:

associating each Virtual Private Network with a unique tag; and

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including in each packet the unique tag corresponding to the Virtual Private Network.